Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A ~~control~~ hemofiltration system ~~(12) for a medical system having at least one pump (16, 60a, 60b, 66, 150) for pumping fluid~~ for fluid removal from the blood of a patient, ~~the control system~~ comprising:

a pump capable of pumping a liquid selected from the group consisting of infusate, drained fluid, and blood in the hemofiltration system;

a sensor ~~(27, 54a, 54b, 78)~~ for measuring the flow rate of fluid in [[a]] the medical system generated by at least one pump ~~(16, 60a, 60b, 66, 150)~~, the flow rate sensor ~~(27, 54a, 54b, 78)~~ providing flow rate data signals correlated to the fluid flow rate[[,]] ; and

a supervisory controller [[(160)]] operably connectable to the at least one pump ~~(16, 60a, 60b, 66, 150) in a medical system~~ and operably connected to the flow rate sensor ~~(27, 54a, 54b, 78), the controller receiving the flow rate data signals and the controller providing an output signal for the at least one pump (16, 60a, 60b, 66, 150) to adjust, as necessary on a periodic ongoing basis, the flow rate of fluid generated by the at least one pump, characterised in that the control system further comprises:~~;

at least one monitor ~~(100, 110, 120, 130, 140)~~ for measuring at least one predetermined patient parameter; said least one patient parameter monitor ~~(100, 110, 120, 130, 140)~~ providing patient parameter data signals correlated to said at least one patient parameter,

~~in that~~ wherein the controller is ~~a supervisory controller (160) which is also~~ operably connected to said at least one ~~patient parameter~~ monitor ~~(100, 110, 120, 130, 140); in that,~~ the controller ~~(160) also receives~~ receiving the flow rate data signals and the patient parameter data signals[[,]] and ~~in that the controller analyses~~ analyzing the ~~received~~ flow rate data signals and the patient parameter data signals ~~utilising~~ utilizing fuzzy logic based on at least one predetermined supervisory rule, and then ~~provides the output signal~~ providing an output signal for the at least one pump to adjust, as necessary on a periodic ongoing basis, the flow rate of liquid generated by the at least one pump for regulating fluid removal from the patient's blood.

2. (Currently Amended) The control system of claim 1, wherein said at least one patient parameter monitor is selected from the group consisting of a blood pressure monitor [[(130)]] providing blood pressure data signals, a heart rate monitor [[(120)]] providing heart rate data signals, and combinations thereof.

3. (Currently Amended) The control system of claim 2, wherein the medical system is an ultrafiltration system and the at least one predetermined supervisory rule is selected from the group consisting of:

a) If heart rate is high and blood pressure is normal or low, then decrease ultrafiltration and wait a first predetermined time.

b) If blood pressure is low and heart rate is normal or high, then decrease ultrafiltration and wait a second predetermined time.

c) If blood pressure is low and heart rate is low, then provide the user a choice between a decrease or increase of the ultrafiltration rate and wait a third predetermined time.

d) If blood pressure is high and heart rate is high for a fourth predetermined time, then provide the user with a choice between a decrease or increase of the ultrafiltration rate.

e) If blood pressure is high and heart rate is low for a fifth predetermined time, then increase ultrafiltration.

f) The lowest possible value of ultrafiltration is a predetermined minimum rate per hour and the highest possible value of the ultrafiltration rate is a predetermined percentage above that of a predetermined maximum ultrafiltration rate.

g) If an increase in ultrafiltration occurs such that the filtered fraction is greater than a predetermined filtered fraction, then increase the blood pump flow such that the filtered fraction equals the predetermined filtered fraction.

4-7. (Cancelled)

8. (Currently Amended) A ~~control~~ hemofiltration system ~~(12) for controlling the pumping rate of at least one pump (16, 60a, 60b, 66, 150) for pumping fluid in a medical system, said control system~~ for fluid removal from the blood of a patient, comprising:

a pump capable of pumping a liquid selected from the group consisting of infusate, drained fluid, and blood in the hemofiltration system;

a flow rate sensor ~~(27, 54a, 54b, 78)~~ for measuring the flow rate of the liquid ~~in a medical system~~ generated by the at least one pump ~~(16, 60a, 60b, 66, 150)~~, the flow rate sensor providing flow rate data signals correlated to the ~~fluid~~ liquid flow rate[[,]]; and

[[a]] an adaptive controller ~~(162, 170, 180a, 180b)~~ operably connectable to the at least one pump ~~(16, 60a, 60b, 66, 150) in a medical system~~ and operably connected to the flow rate sensor ~~(27, 54a, 54b, 78)~~, the controller ~~(162, 170, 180a, 180b)~~ receiving the flow rate data signals and generating an output signal for adjusting the pumping rate of ~~fluid~~ the liquid generated by the at least one pump ~~(16, 60a, 60b, 66, 150)~~, the controller providing the output signal for the at least one pump on a periodic ongoing basis, ~~characterised in that the controller is an adaptive controller (162, 170, 180a, 180b)~~, the controller ~~(162, 170, 180a, 180b)~~ using an adaptive law to generate a set of controller parameters for correcting time-dependent deviations of the flow rate from a predetermined flow rate, and using a control law to generate the output signal from the set of controller parameters for adjusting the pumping rate of ~~fluid~~ the liquid generated by the at least one pump ~~(16, 60a, 60b, 66, 150)~~ to achieve the predetermined flow rate for regulating fluid removal from the patient's blood.

9. (Original) The control system of claim 8, wherein the adaptive law further includes parameter projections to limit the output signal to a range between a predetermined minimum output signal and a predetermined maximum output signal.

10-14. (Cancelled)

15. (Currently Amended) A method of controlling a pump ~~pumping fluid~~ in a ~~medical~~ hemofiltration system, comprising:

measuring the flow rate of ~~a fluid in a medical system~~ a liquid selected from the group consisting of infusate, drained fluid, and blood generated by [[a]] the pump ~~(16, 60a, 60b, 66, 150)~~ to obtain flow rate data signals correlated to the fluid flow rate; ~~and providing an output signal to the pump (16, 60a, 60b, 66, 150) to adjust, as necessary on a periodic ongoing basis, the flow rate of fluid generated by the pump, characterised in that the method further comprises~~

measuring at least one patient parameter to obtain patient parameter data signals correlated to said at least one patient parameter[[,]] ; ~~and analysing~~

analyzing the flow rate data signals and the patient parameter data signals ~~utilising~~ utilizing fuzzy logic based on at least one predetermined supervisory rule[[,]] ; and

[[then]] providing [[the]] an output signal to the pump to adjust, as necessary on a periodic ongoing basis, the flow rate of liquid generated by the pump for regulating fluid removal from the patient's blood.

16. (Currently Amended) A method of controlling a pump ~~pumping fluid~~ in ~~a medical~~ an ultrafiltration system, comprising:

measuring [[the]] a flow rate of a ~~fluid in a medical system~~ liquid selected from the group consisting of infusate, drained fluid, and blood in the hemofiltration system generated by [[a]] the pump ~~(16, 60a, 60b, 66, 150)~~ to obtain flow rate data signals correlated to the ~~fluid~~ liquid flow rate[[,]] ;

generating a set of controller parameters from the flow rate signals for correcting time-dependent deviations of the flow rate from the predetermined flow rate;

generating an output signal using a control law from the set of controller parameters, the output signal capable of adjusting the pumping rate of liquid generated by the pump to achieve a predetermined flow rate[[,]] ; and

providing the output signal to the pump ~~(16, 60a, 60b, 66, 150)~~ on a periodic ongoing basis to correct the deviations of the flow rate from the predetermined flow rate[[,]] ~~characterised in that the method further comprises generating a set of controller parameters from the flow rate signals for correcting time-dependent deviations of the flow rate from the predetermined flow rate and generating the output signal using a control law from the set of controller parameters~~ for regulating fluid removal from the patient's blood.

17. (Currently Amended) Hemofiltration method for removal of fluid from the blood of a patient, comprising:

pumping blood from a patient through a hemofilter [[(24)]] and back to the patient[[,]] ;

monitoring the blood outflow from the blood pump [[(16)]] and generating blood flow rate data signals[[,]] ;

maintaining a supply of infusate in a first reservoir [[(50),]];

monitoring the weight of infusate in the first reservoir [[(50)]] and generating infusate flow rate data signals, pumping the infusate to the hemofilter [[(24),]];

pumping drained fluid from the hemofilter [[(24)]] into a second reservoir [[(74),]];

monitoring the weight of drained fluid in the second reservoir [[(74)]] and generating drained fluid flow rate data signals[[,]] ;

monitoring at least one predetermined patient parameter, such as patient heart rate and/or blood pressure, and generating parameter data signals correlated thereto; and

controlling the pumping rate of the blood, the drained fluid, and the infusate with a programmed computer, the computer being responsive to the flow rate data signals, the computer:

receiving the flow rate data and parameter data signals;

analyzing the received signals with fuzzy logic based on at least one predetermined supervisory rule; and

generating an output signal to each pump ~~(16, 60a, 60b, 66, 150)~~ based upon the analysis of the received flow rate data and parameter data signals to adjust, as necessary on a periodic ongoing basis, the flow rate of fluid generated by each pump ~~(16, 60a, 60b, 66, 150), characterised in that the method further comprises monitoring at least one predetermined patient parameter, such as patient heart rate and/or blood pressure, and generating parameter data signals correlated thereto, and in that the computer also receives the parameter data signals, utilises a supervisory controller (160) to analyse the received signals utilising fuzzy logic based on at least one predetermined supervisory rule, and then generates the output signal~~ for regulating fluid removal from the patient's blood.

18. (Currently Amended) Hemofiltration method for removal of fluid from the blood of a patient, comprising

pumping blood from a patient through a hemofilter [[(24)]] and back to the patient[[,]] ;

sensing the performance of the blood pump and generating a first set of controller parameters from a first adaptive law;

monitoring the blood outflow from the blood pump [[(16)]] and generating blood flow rate data signals[[,]] ;

maintaining a supply of infusate in a first reservoir [[(50),]];

monitoring the weight of infusate in the first reservoir [[(50)]] and generating infusate flow rate data signals[[,]] ;

pumping the infusate to the hemofilter [[(24),]];

sensing the performance of the infusate pump and generating a second set of controller parameters from a second adaptive law;

pumping drained fluid from the hemofilter [[(24)]] into a second reservoir [[(74),]];

monitoring the weight of drained fluid in the second reservoir [[(74)]] and generating drained fluid flow rate data signals[[,]] ;

sensing the performance of the drained fluid pump and generating a third set of controller parameters from a third adaptive law;

controlling the pumping rate of the blood, the drained fluid, and the infusate with a programmed computer to correspond to a set of predetermined pumping rates, the computer being responsive to the flow rate data signals and the controller parameters,

using a control law to generate an output signal from the flow rate data signals and the controller parameters for correcting time-dependent deviations of the flow rate from the set of predetermined pumping rates; and

providing [[an]] the output signal to at least one pump ~~(16, 60a, 60b, 66, 150)~~ on a periodic ongoing basis, ~~characterised in that the method further comprises sensing the performance of the blood pump (16) and generating a first set of controller parameters from a first adaptive law, sending the performance of the infusate pump (60) and generating a second set of controller parameters from a second adaptive law and sensing the performance of the drained fluid pump (66) and generating a third set of controller parameters from a third adaptive law, and in that the computer also receives the controller parameters and uses a control law to generate the output signal from the flow rate data signals and the controller parameters for correcting time-dependent deviations of the flow rate from the set of predetermined pumping rates~~ for regulating fluid removal from the patient's blood.

19. (New) The control system of claim 2, wherein the sensor is selected from the group consisting of a flowmeter and a weight scale.

20. (New) Continuous hemofiltration system for removal of fluid from the blood of a patient, comprising:

a hemofilter;

a first pump for pumping blood from a patient through said hemofilter and back to the patient;

a flowmeter downstream of said first pump to measure the blood outflow rate from the blood pump, said flowmeter generating blood flow rate data signals correlated to the blood outflow rate;

a first reservoir for maintaining a supply of infusate;

a second pump for pumping the infusate from said first reservoir to said hemofilter;

a second reservoir for receiving drained fluid from said hemofilter;

a third pump for pumping the drained fluid from said hemofilter to said second reservoir; and

an adaptive controller operably connected to said first pump and to said blood flowmeter, said adaptive controller receiving said blood flow rate data signals, using an adaptive law to generate a set of controller parameters for correcting time-dependent deviations of the blood outflow rate from a target blood outflow rate, and using a control law to generate an output signal from the set of controller parameters for adjusting the pumping rate of fluid generated by the first pump to achieve the target blood flow rate, said adaptive controller then providing the output signal to the first pump on a periodic ongoing basis for regulating fluid removal from the patient's blood.

21. (New) The continuous hemofiltration system of claim 20, further comprising:

at least one monitor for measuring at least one predetermined patient parameter, said least one patient parameter monitor providing patient parameter data signals correlated to said at least one patient parameter;

a first scale to measure the weight of infusate in said first reservoir, said first scale generating infusate flow rate data signals correlated to the infusate weight;

a second scale to measure the weight of drained fluid in said second reservoir, said second scale generating drained fluid flow rate data signals correlated to the drained fluid weight; and

a supervisory controller operably connected to said pumps, to said flowmeter, to said scales, and to said at least one patient parameter monitor, said controller receiving said flow rate data signals and said patient parameter data signals and analyzing said signals utilizing fuzzy logic based on at least one predetermined supervisory rule, said controller then providing an output signal to said pumps to adjust, as necessary on a periodic ongoing basis, the flow rate of fluid generated by each at least one pump for regulating fluid removal from the patient's blood.

22. (New) Continuous hemofiltration system for removal of fluid from the blood of a patient, comprising:

a hemofilter;

a first pump for pumping blood from a patient through said hemofilter and back to the patient;

a flowmeter downstream of said first pump to measure the blood outflow rate from the blood pump, said flowmeter generating blood flow rate data signals correlated to the blood outflow rate;

a first reservoir for maintaining a supply of infusate;

a first scale to measure the weight of infusate in said first reservoir, said first scale generating infusate flow rate data signals correlated to the infusate weight;

a second pump for pumping the infusate from said first reservoir to said hemofilter;

a second reservoir for receiving drained fluid from said hemofilter;

a second scale to measure the weight of drained fluid in said second reservoir, said second scale generating drained fluid flow rate data signals correlated to the drained fluid weight;

a third pump for pumping the drained fluid from said hemofilter to said second reservoir;

at least one monitor for measuring at least one patient parameter, said least one patient parameter monitor providing patient parameter data signals correlated to said at least one patient parameter; and

a supervisory controller operably connected to said first, second and third pumps, to said flowmeter, to said first and second scales, and to said at least one patient parameter monitor, said controller receiving the blood flow rate data signals, the infusate flow rate data signals, the drained fluid flow rate data signals, and the patient parameter data signals, said supervisory controller analyzing said signals utilizing fuzzy logic based on at least one predetermined supervisory rule, and said supervisory controller then providing an output signal to one or more of said first, second and third pumps to adjust, as necessary on a periodic ongoing basis, the flow rate of fluid generated by the one or more of said first, second and third pumps for regulating fluid removal from the patient's blood.

23. (New) The control system of claim 1, further comprising a second sensor for measuring the flow rate of fluid generated by a second pump, the second flow rate sensor providing second flow rate data signals correlated to the fluid flow rate, wherein the supervisory controller is further operably connectable to the second pump and operably connected to the second flow rate sensor, the controller receiving the second flow rate data signals and analyzing the signals utilizing fuzzy logic based on at least one predetermined supervisory rule and the controller then providing an output signal for the second pump to adjust, as necessary on a periodic ongoing basis, the flow rate of fluid generated by the second pump.

24. (New) The control system of claim 23, further comprising a third sensor for measuring the flow rate of fluid in the medical system generated by a third pump, the third flow rate sensor providing third flow rate data signals correlated to the fluid flow rate, wherein the supervisory

controller is further operably connectable to the third pump and operably connected to the third flow rate sensor, the controller receiving the third flow rate data signals and analyzing the signals utilizing fuzzy logic based on at least one predetermined supervisory rule and the controller then providing an output signal for the third pump to adjust, as necessary on a periodic ongoing basis, the flow rate of fluid generated by the third pump.

25. (New) The control system of claim 24, further comprising:

a fourth sensor for measuring the flow rate of fluid in the medical system generated by a fourth pump, the fourth flow rate sensor providing fourth flow rate data signals correlated to the fluid flow rate, wherein the supervisory controller is further operably connectable to the fourth pump and operably connected to the fourth flow rate sensor, the controller receiving the fourth flow rate data signals and analyzing the signals utilizing fuzzy logic based on at least one predetermined supervisory rule and the controller then providing an output signal to the fourth pump to adjust, as necessary on a periodic ongoing basis, the flow rate of fluid generated by the fourth pump.

26. (New) The control system of claim 1, further comprising an adaptive controller operably connectable to the pump and to said flow rate sensor, the adaptive controller receiving said flow rate data signals, using an adaptive law to generate a set of controller parameters for correcting time-dependent deviations of the flow rate of the respective fluid from a predetermined blood flow rate, and using a control law to generate an output signal from the set of controller parameters for adjusting the pumping rate of fluid generated by the pump to achieve the

predetermined blood flow rate, said adaptive controller then providing the output signal for the pump~~)~~ on a periodic ongoing basis.

27. (New) The control system of claim 8, wherein the sensor is selected from the group consisting of a flowmeter and a weight scale.

28. (New) The control system of claim 27, wherein the sensor is a weight scale providing weight data signals and the flow rate data signals comprise the rate change in the weight data signals.